Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, D.C.

In the Matter of	)	
	)	
Amendment of Parts 2, 15, and 97 of the	)	
Commission's Rules To Permit Use of	)	ET Docket No. 94-124
Radio Frequencies Above 40 GHz for	)	RM-8308
New Radio Applications	)	
	)	
International Harmonization of Frequency	)	
Bands Above 40 GHz	)	
	)	
Petition of Sky Station International, Inc.,	)	
For Amendment of the Commission's	)	
Rules To Establish Requirements for a	)	RM-8784
Global Stratospheric Telecommunications	)	
Service in the 47.2-47.5 GHz and	)	
47.9-48.2 GHz Frequency Bands	)	

SECOND REPORT AND ORDER

Adopted: May 2, 1997 Released: July 21, 1997

By the Commission:

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I. INTRODUCTION AND SUMMARY

1. This action is part of an ongoing proceeding to open for commercial development portions of the spectrum known as the millimeter wave bands above 40 GHz.[1] We initiated

[1] The term ``millimeter wave" refers to the fact that the wavelength of radio signals for frequencies between 30 GHz and 300 GHz ranges from 10 millimeters down to 1 millimeter.

the proceeding by adopting a Notice of Proposed Rulemaking in 1994.[2] The pleadings filed in response to this *First NPRM* are listed in Appendix A.

2. We adopt in this Order our proposal in the *First NPRM* to designate for commercial use on a licensed basis the 47.4-48.2 GHz band, together with the 47.2-47.4 GHz band made available in the *First Report and Order*,[3] for a total of one gigahertz of spectrum (47 GHz band). Further, we adopt our proposals to establish a licensing framework that permits the full range of services allowed under the Table of Frequency Allocations (Allocation Table) in our rules[4] and to define service rules based on our best judgment of what the dominant use of the spectrum is likely to be. We find that the most likely dominant use will be fixed, point-to-multipoint services delivered through the deployment of fixed platforms located in the stratosphere, without foreclosing the other uses under the Allocation Table. We adopt our proposal to license operations on an area-wide basis and we determine to divide the spectrum into five pairs of license blocks of 100 megahertz each, with each pair separated by 500 megahertz of spectrum.

3. We conclude that opening this spectrum for commercial licensed use under our licensing framework will stimulate the development of millimeter wave technology to provide new wireless communications services that are in demand by consumers. The broad degree of flexibility regarding the permissible range of services will ensure the ability of carriers to respond to the market, will promote competition, and will provide for the most efficient and effective services. We will initiate a proceeding in the near future to propose service rules in order to implement our determinations in this Order for the licensing of the 47 GHz band. The proposed rules will include proposals relating to auctions. We also defer to future proceedings our consideration of the additional frequency bands above 40 GHz that we proposed for licensed use in the *First NPRM*, as well as the additional bands we proposed for unlicensed use that were not considered in the *First Report and Order.*

4. It is our intent to complete the licensing of the 47 GHz band as quickly as possible to achieve our goal in the *First NPRM* to promote the commercial availability of millimeter wave technologies in providing the potentially valuable uses of licensed spectrum above 40 GHz. Our actions in this Order also are intended to facilitate the licensing of the 47 GHz band as part of the overall band plan we are developing to accommodate predominantly satellite and terrestrial wireless uses for the bands between 36 GHz and 51.4 GHz in the *36-51*

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[2] Amendment of Parts 2 and 15 of the Commission's Rules To Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications, ET Docket No. 94-124, RM-8308, Notice of Proposed Rulemaking, 9 FCC Rcd 7078 (1994) (*First NPRM*).

[3] Amendment of Parts 2 and 15 of the Commission's Rules To Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications, ET Docket No. 94-124, RM-8308, First Report and Order and Second Notice of Proposed Rulemaking, 11 FCC Rcd 4481 (1995) (*First Report and Order*).

[4] 47 C.F.R. § 2.106.

GHz Band Plan NPRM released March 24, 1997.[5] In that proceeding, we found that technological developments sparked new uses for the bands that were not contemplated in the *First NPRM*, including the stratospheric telecommunications system proposed by Sky Station International, Inc. (Sky Station), in the 47 GHz band.[6]

5. Inasmuch as the record in response to the *First NPRM* is complete and the 47 GHz band is unchanged by our spectrum proposals in the *36-51 GHz Band Plan NPRM*, we are able to proceed to final action in this Order on our proposal to open the band to commercial, licensed use. Our action will help advance the goals of that plan to manage the spectrum in a manner that promotes open entry, appropriate flexibility, technical innovation, and seamless networks in order to provide the public with the effective and efficient radiocommuncations services it seeks.[7] In the *36-51 GHz Band Plan NPRM*, we found no reason to postpone our final action in this proceeding, believing such delay would unnecessarily delay introducing new services to the telecommunications market.[8]

II. BACKGROUND

6. In the *First NPRM*, we found that millimeter wave radio spectrum above 40 GHz generally is unused and that we had not previously adopted service rules to permit general use of the spectrum. Government-funded projects had resulted in a number of military and scientific applications that appeared to be useful for more general radio communications applications. In response to interest in commercial terrestrial uses for the millimeter wave technology, we proposed to open 18 gigahertz of spectrum between 40.5 GHz and 153 GHz for commercial use, most of which would be on a continued shared basis with Government opera-

[5] Allocation and Designation of Spectrum for Fixed Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.5-50.2 GHz Frequency Bands; Allocation of Spectrum To Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band, Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations, IB Docket No. 97-95, Notice of Proposed Rulemaking, FCC No. 97-85, released Mar. 24, 1997 (*36-51 GHz Band Plan NPRM*).

[6] *Id.* at para. 17.

[7] *Id.* at paras. 11, 16.

[8] In the *36-51 GHz Band Plan NPRM*, we solicited comment regarding specific changes to the domestic and international allocation tables that may be necessary as a result of our proposed spectrum designations in that NPRM. *Id.* at paras. 26, 34. In a Public Notice released in this docket on June 23, 1995, we requested comment regarding the need for harmonizing our proposals in the *First NPRM* with international allocations. FCC Public Notice, DA 95-1415, International Harmonization of Frequency Bands Above 40 GHz, ET Docket No. 94-124, released June 23, 1995 (*Above 40 GHz Public Notice*). See para. 16, *infra*. We find that our prior request is superseded by the request in the *36-51 GHz Band Plan NPRM*.

tions.[9] We held that opening these portions of the millimeter wave spectrum should stimulate new applications of the technology to the benefit of consumers, facilitate technology transfer from the military sector, create opportunities for economic growth and jobs, and promote American competitiveness internationally.

7. We pointed out that the propagation of millimeter wave radio signals is more limited than that of radio signals at lower frequencies. Although the limited range of the signals may appear to be a disadvantage, we noted that the ability to reuse frequencies within very short distances will allow a higher concentration of transmitters to be located in a geographical area than is possible with lower-frequency transmitters. In addition, the wide bandwidth that is possible in the millimeter wave spectrum can support the operation of wireless communications links with capacity approaching that of coaxial cable and fiber optic systems. We thus anticipated that millimeter wave spectrum would be suitable for many types of short-range communications systems, and that the large amount of available spectrum could accommodate the wide channel bandwidth that is needed for rapid transmission of large volumes of data.[10]

8. We proposed to allocate the 18 gigahertz of spectrum between licensed and unlicensed commercial terrestrial facilities.[11] Specifically, we proposed that 6.3 gigahertz in nine bands should be allocated to licensed services, beginning with 40.5-42.5 GHz and 47.4-48.2 GHz in the lower bands, with the remaining bands extending between 71.0-71.5 GHz to 152.0-152.5 GHz. An additional 8.5 gigahertz of spectrum in eight bands would be designated for general unlicensed operations, while 3.2 gigahertz in four bands would be for unlicensed vehicular radar operations. Our proposal for unlicensed vehicular radar systems included the 47.2-47.4 GHz frequency band segment. We proposed that the 47 GHz band be used mostly for licensed services, inasmuch as the band is less than 10 gigahertz away from an existing band below 40 GHz with similar propagation characteristics and technology, but that we would also consider reserving the small portion in response to requests for the unlicensed radar operations. We expected that the significant demand for licensed services on frequencies below 40 GHz would indicate a demand for licensed spectrum in the nearby millimeter wave regions with similar characteristics.[12]

9. We requested comment on the suitability of the specific bands, including 47 GHz, for commercial use by millimeter wave technologies. We requested suggestions for enhancing the use of such bands for particular services,[13] and we requested comment on alternative ap-

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[9] *First NPRM*, 9 FCC Rcd at 7079-80 (paras. 4-7).

[10] *Id.* at 7081-82 (paras. 8-9).

[11] *Id.* at 7083 (para. 11), 7085-86 (paras. 17-18).

[12] *Id.* at 7085 (para. 17).

[13] *Id.* at 7083-85 (paras. 12-13, 17).

proaches to dividing the proposed bands between licensed and unlicensed services. We noted that the final rules to be adopted may change significantly from our proposals because of the comments and recommendations that may be received in response to these requests.[14]

10. For the licensed bands, we found that, despite range limitations and the current high cost of technology, there may be many potentially valuable uses of licensed spectrum above 40 GHz.[15] We noted that the current allocations for these bands in the international and domestic Allocation Table include a wide diversity of terrestrial and satellite services of a fixed, mobile, or broadcasting nature. We found little information as to which potential services represent the highest valued use of this spectrum. Accordingly, we proposed to license the full range of services allowed under the Allocation Table and to permit any of the services currently listed in the Table for that frequency.

11. Because we proposed to permit such a wide range of services, we concluded that we would have to depart from our customary approach of determining licensing issues in the context of a specific service. We proposed to define service rules to govern the bands based on our best judgment of what the dominant use of the spectrum is likely to be, rather than designing them around a prescribed use. We determined that precision is less important because of the broad degree of flexibility we propose for licensees to provide service and adjust to the market. We believed that the important objective was to open the spectrum for commercial development and eliminate the current regulatory barriers that prevent the spectrum from being used.[16]

12. We tentatively concluded in the *First NPRM* that many of the uses of millimeter spectrum are likely to be technically and operationally similar to those contemplated for Local Multipoint Distribution Service (LMDS) that was proposed for the 28 GHz band.[17] These would be fixed point-to-point or point-to-multipoint services for video, voice, and data transmission to subscribers throughout an area. We therefore proposed to model any licensing rules

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[14] *Id.* at 7091-92 (para. 31).

[15] *Id.* at 7087 (para. 21).

[16] *First NPRM*, 9 FCC Rcd at 7087 (para. 22).

[17] *Id.* at 7087-88 (para. 23), citing Rulemaking To Amend Part 1 and Part 21 of the Commission's Rules To Redesignate the 27.5-29.5 GHz Frequency Band and To Establish Rules and Policies for Local Multipoint Distribution Service: RM-7872, RM-7722, Applications for Waiver of the Commission's Common Carrier Point-to-Point Microwave Radio Service Rules, Suite 12 Group Petition for Pioneer's Preference: PP-22, University of Texas - Pan American Petition for Reconsideration of Pioneer's Preference Request Denial, CC Docket No. 92-297; Notice of Proposed Rulemaking, Order, Tentative Decision, and Order on Reconsideration, 8 FCC Rcd 557 (1993) (*LMDS First NPRM*).

for the bands after the rules and procedures proposed for LMDS in Part 21 of the Commission's Rules.[18]

13. We requested comment as to any modifications to the proposed LMDS rules that may be appropriate in the licensing of millimeter spectrum. Like LMDS, we proposed to authorize licenses on an area-wide basis. Unlike LMDS, we did not propose to use Rand McNally Basic Trading Areas as the service areas, because LMDS was more narrowly prescribed. We stated that we were proposing to allow a much broader range of uses and technologies in the millimeter wave bands, which might require larger service areas such as Rand McNally Major Trading Areas (MTAs). As our LMDS proposal at that time, we proposed to divide the available spectrum into two equal license blocks for exclusive assignment in each area. We noted that, for example, the 47.4-48.2 GHz licensed band would be divided into two 400 megahertz contiguous blocks. We requested comments on whether this is an appropriate division of spectrum in these various bands and whether the licensed blocks should be contiguous or further subdivided into paired blocks to facilitate duplex (two-way) transmission.[19]

14. In addition, we proposed to use auctions to award licenses among mutually exclusive applications. We believed that the principal use of the spectrum to be licensed as proposed would likely be of a commercial nature and involve the receipt by the licensee of compensation from subscribers in return for service.[20] We also sought comment on the sharing of spectrum between Government and non-Government users. In addition, because we proposed to allow licensees broad flexibility to choose the technologies and bandwidth of fixed applications to operate, we proposed that they be subject only to technical rules intended to minimize interference to other licensed users of these bands. We proposed to limit the power of licensed transmitters to 16 dBW equivalent isotropically radiated power (EIRP). We requested comment on the need for field strength limits at the boundaries or for rules requiring interference coordination, among other technical requirements.[21]

15. On December 15, 1995, we released the *First Report and Order* addressing our proposals for vehicle radar systems operating below 80 GHz and for general purpose, unlicensed devices operating in the 59-64 GHz bands. We declined to adopt our proposal to des-

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[18] We subsequently adopted service rules in Part 101 of our Rules to implement LMDS in the 28 GHz and 31 GHz bands. See, Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services: CC Docket No. 92-297, First Report and Order and Fourth Notice of Proposed Rulemaking, 11 FCC Rcd 19005 (1996) (*LMDS First Report and Order*); Second Report and Order, Order on Reconsideration, and Fifth Notice of Proposed Rulemaking, FCC 97-82, released March 13, 1997 (*LMDS Second Report and Order*).

[19] *First NPRM*, 9 FCC Rcd at 7088 (para. 23).

[20] *Id.* at 7089-90 (paras. 25-27).

[21] *Id.* at 7092-94 (paras. 33-37).

ignate the spectrum at 47.2-47.4 GHz for vehicular radar operations, but rather designated the 46.7-46.9 GHz band for such operations in order to provide for additional licensed operations in the 47 GHz band.[22] The unlicensed commercial bands, which are at 46.7-46.9 GHz, 59-64 GHz, and 76-77 GHz, would permit the development of vehicle radar systems and short-range, high capacity wireless radio systems that could be used for educational and medical applications, wireless access to libraries, or other information databases. We deferred our pending proposals related to bands for licensed services, vehicular radar operations above 80 GHz, and other unlicensed bands for consideration in future proceedings.

16. On June 23, 1995, we released the *Above 40 GHz Public Notice* requesting supplemental comments regarding the desirability and feasibility of harmonizing the proposals we made in the *First NPRM* and the European frequency allocation table, and regarding whether any of the bands proposed in the *First NPRM* should be changed to facilitate worldwide marketing and use of radio transmitting equipment.[23] Parties filing comments to the Public Notice are separately listed in Appendix A.

17. On March 20, 1996, Sky Station filed in this docket a Request To Establish New GSTS Service, Additional Comments, and Petition for Rulemaking (hereinafter cited as Request and Petition), which was the subject of a Public Notice.[24] Sky Station requests that we authorize use of the spectrum at 47.2-47.5 GHz and 47.9-48.2 GHz for a new commercial, licensed service described as the Global Stratospheric Telecommunications Service (GSTS), and that we adopt service rules either in this proceeding or a separate rulemaking to implement the service. Sky Station filed concurrently an application (hereinafter cited as Application) for authorization to construct and operate its proposed service to provide a global network of wireless communications services, subject to amendment pending the outcome of its Request and Petition. A Public Notice was issued accepting the Application for filing and accepting petitions, oppositions, and other pleadings filed in response to that Public Notice.[25] Comments to the Request and Petition, and to the Application, are listed in Appendix A.

18. Subsequently, we released the *36-51 GHz Band Plan NPRM* on March 24, 1997, to address the competing interests between satellite and terrestrial services for licensing the millimeter wave spectrum between 36 and 51.4 GHz.[26] We set forth a broad plan in which the spectrum would be segmented between bands designated predominantly for satellite uses and

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[22] *First Report and Order*, 11 FCC Rcd at 4483-84 (paras. 9-11).

[23] As we have stated, the *36-51 GHz Band Plan NPRM* has superseded the *Above 40 GHz Public Notice*. See note 7, *supra*.

[24] FCC Public Notice, Report No. 2127, Mimeo No. 62231, released Apr. 1, 1996. The Public Notice requested comment on the Request and Petition.

[25] FCC Public Notice, Sky Station International, Inc., File No. 96-SAT-P/LA-96, released Apr. 22, 1996.

[26] *36-51 GHz Band Plan NPRM*, at paras. 9-16.

bands designated predominantly for terrestrial uses in recognition that some satellite and terrestrial systems cannot share the same spectrum without significant technical constraints. We proposed to continue to designate the spectrum at 47.2-48.2 GHz (47 GHz band) for terrestrial wireless commercial service. We found that Sky Station's proposal to implement a stratospheric radio relay repeater system from platforms is a terrestrial service that is to be considered in this ET Docket 94-124 proceeding.[27]

III. DISCUSSION

A. Introduction

19. In this Order, we limit consideration of the bands we proposed to designate for commercial, licensed use in the *First NPRM* to the 47 GHz band. This band consists of the 47.4-48.2 GHz segment originally set forth in the *First NPRM* and the adjoining 47.2-47.4 GHz segment we made available for such use in the *First Report and Order*. We did not propose any changes to this band in the *36-51 GHz Band Plan NPRM*, where we designated the band for predominantly wireless terrestrial services. We found that comments had already been received on this band segment in response to the *First NPRM* on which we could proceed to take action without delay.[28] Thus, our proposals in the *First NPRM* as they apply to the 47 GHz band are ripe for disposition at this time.

20. The comments filed in this docket for our consideration in this Order consist of two sets. First, we have the comments filed in direct response to our proposals in the *First NPRM*, to the extent those comments are pertinent to the issues we resolve in this Order. Second, we have the comments filed in response to the respective Public Notices accepting the Request and Petition, and the Application, filed by Sky Station on March 20, 1996, in this docket. Both the filings by Sky Station and the responsive pleadings concern our proposals to license the 47 GHz band, but were filed after the comment period to the *First NPRM* closed and raise issues not addressed in our proposals. Because the Sky Station filings and responsive pleadings are pertinent to the issues before us, we have decided to take these filings and pleadings into account in connection with the decisions we make in this Order. We do so in the following section, before turning to the disposition of the issues specifically raised in the *First NPRM*.

21. As more fully discussed below, we take final action on our specific proposals to open the 47 GHz band to commercial use on a licensed basis under a flexible licensing framework. We also take action on our proposal to determine the potential dominant use of the band in order to prescribe appropriate service rules. We will issue a Notice of Proposed

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[27] *Id.* at para. 17.

[28] *Id.* at para. 14 n.16, para. 16 n.20.

Rulemaking in this docket in the near future in order to propose the service rules, including auction, technical, and other rules to implement our determinations in this Order.

22. We defer to that proceeding additional matters raised in the record as they pertain to implementing services on the 47 GHz band. These include the request of CORF that we ensure that commercial uses in 47 GHz do not interfere with radio astronomy and other passive uses under the existing allocations in the adjacent 48.94-49.04 GHz band.[29] It also includes the request of NTIA, among others, that we consider the impact of licensing commercial uses on a band that is allocated to both Government and non-Government use on a shared co-primary basis, and that we ensure the band remains accessible to Federal agencies.[30] In addition, some of the comments that support opening the spectrum above 40 GHz for commercial use otherwise request that portions of the spectrum either be reserved for educational and public service uses or that we require commercial licensees to provide free or reduced-rate access for such uses.[31] We intend to address these comments in our further proceeding on service rules for licensing in the 47 GHz band.

B. Use of Stratospheric Platform Technology in 47 GHz Band

1. Sky Station Request and Petition; Sky Station Application

23. In its Request and Petition, and Application, Sky Station states that it has developed a new technology for delivery of a new paradigm of wireless telecommunications services that it identifies as GSTS, to compete with existing satellite and terrestrial wireless services. Sky Station explains that GSTS is based on the concept of using a network of platforms in the stratosphere that are kept aloft in fixed positions by hydrogen or helium elements at an altitude of 30 kilometers, or 18 miles, above 99 percent of the atmosphere. Unlike satellite services, these platforms are not launched into orbit in space, but rather are lifted by balloons similar to dirigibles to an area in the stratosphere above flight patterns and below satellite orbits.[32]

24. As explained in the Request and Petition and the Application, the platform would contain a communications payload consisting of transmitting, receiving, and other related equipment with a total weight of approximately 37 tons. The platforms are propelled by the

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[29] CORF Comments at 5.

[30] NTIA Comments at 2-3.

[31] Clarendon Comments at 1-6; Educational Parties Comments at 1-9; GEC Comments at 1-10; TSUM Comments at 1-2; Apple Reply Comments at 5; APTS and PBS Reply Comments at 2; Western Reply Comments at 1-2.

[32] Sky Station Request and Petition at 1-4; Sky Station Application at 2-7. *See also* Sky Station Consolidated Opposition at Appendix 1, paras. 7-9.

Corona Ion Engine that uses the surrounding atmosphere and the sun as its fuel sources. The system is to cover the globe by positioning 250 platforms during a five-year period. The second component of the system is the GSTS control facilities, which are ground control and switching centers that serve as base stations and remain in line-of-sight contact with the platforms. A third component is the GSTS communicators, which are small personal communications devices used by the consumer and based on solid state Multilithic Microwave Integrated Circuits (MMICs) developed by the Department of Defense.[33]

25. Sky Station asserts that the platforms would be positioned above the 250 major metropolitan areas in the world to provide nearly universal coverage. Each platform provides coverage in three concentric circles, defined as coverage contours, determined by the degree angle of elevation from the ground to a platform. The High Area Coverage Zone extends 30 miles, the Wide Area Coverage Zone extends 100 miles, and the Footprint Area Coverage Zone extends 350 miles from beneath each platform. The platforms will employ a high level of frequency reuse. The system would use digital coding and decoding standards to provide for good quality voice and video communications at a 64 kbps data rate, or use additional techniques to enhance performance. The systems will interconnect with the public switched telephone network in essentially the same way as other wireless systems. The systems also are planned to route calls via lasers that link the stratospheric platforms to each other. The systems will offer broadband Personal Communications Service (PCS) with video and Internet or World Wide Web access capabilities.[34]

26. In the Request and Petition, Sky Station argues that opening up a portion of the 47 GHz band for the proposed system will promote the policy goals we established in the *First NPRM* and meet numerous environmental, economic, and social public interest objectives. It requests we adopt proposed technical, financial, implementation, and licensing standards that encourage commercial development of the unused 47 GHz band and promote competition consistent with the flexible framework we proposed in the *First NPRM*. The service rules advocated by Sky Station in its Request and Petition would enable all qualified applicants to construct and operate their own systems as part of the entire GSTS, and the GSTS would be designed to cover 80 percent of the world's population by a certain date.[35]

27. Sky Station requests that we dedicate exclusively for GSTS that portion at 47.2-47.5 GHz for earth-to-stratosphere communications and 47.9-48.2 GHz for stratosphere-to-earth communications. It argues that a minimum allocation of 600 megahertz of spectrum is needed to support the global scope of the proposed service. It contends that the high elevation angles and high power of the platforms are uniquely suited for the 47 GHz band to provide

[33] Sky Station Request and Petition at 3-5; Sky Station Application at 3-11.

[34] Sky Station Request and Petition at 5-8; Sky Station Application at 15-23.

[35] Sky Station Request and Petition at 8-11.

useful and reliable communications links. It contends that the success of GSTS depends upon our allocating the spectrum as requested, because all other frequency bands it examined were incompatible, subject to restrictions, not allocated for fixed and mobile uses, or heavily encumbered. Sky Station argues that its service is covered by the Allocation Table, which provides for fixed and mobile service. However, it requests that we modify the Table to permit only fixed and mobile GSTS stations to operate in the two portions of the 47 GHz band, inasmuch as it contends that the service cannot share co-channel frequencies with conventional fixed, mobile, or fixed satellite services. It also requests that International footnote 901 be modified, as well as U.S. footnote 297, in order to eliminate sharing with broadcasting-satellite service feeder links, which also could interfere with GSTS and could operate elsewhere.[36]

28. Sky Station requests authorization in the Application to implement its proposed service. It argues that the Application demonstrates that Sky Station is in compliance with the technical, financial, licensing, and other regulations it has requested we adopt in the Request and Petition. Sky Station reserves the right to amend this application to comply with any future rules we may adopt for its proposed service. The Application includes a request for a pioneer preference in the event that mutually-exclusive applications are filed.[37]

29. On December 24, 1996, Sky Station submitted further comments to clarify its Request and Petition. Sky Station argues that we should grant its alternative request in the Request and Petition to treat the filing as additional comments in response to the *First NPRM*, and that a new rulemaking proceeding to adopt separate service rules for its proposed stratospheric service is neither necessary nor appropriate. It requests we hold the Application in abeyance. Sky Station argues that our proposal for the commercial, licensed use of the 47 GHz band has been open for comment since the *First NPRM* and that its comments on the pending issues together with the other comments in this docket provide an adequate record on which to resolve the issues to be determined in this Order.[38]

30. In its further comments, Sky Station argues that its proposed service is a fixed terrestrial service and that we need not allocate the requested spectrum to a new global stratospheric service, apart from other fixed service millimeter wave uses.[39] It argues that a generic terrestrial allocation for a flexible fixed (non-satellite) service would suffice, so that it would compete with other aspiring fixed service providers in auctions for this spectrum. Sky Station argues that its proposed operations generally fit well within the service rules we proposed in the *First NPRM* to adopt for licensed services above 40 GHz, including the 47 GHz band,

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[36] *Id.* at 11-15, Attachment 3; Sky Station Reply Comments at 6-8.

[37] Sky Station Application at 1.

[38] Sky Station Further Comments at 1, 7.

[39] *Id.* at 2-3.

which rules are now contained in Part 101.[40] Sky Station submits modifications to the proposed rules that it argues are minor but necessary to accommodate its proposed service in the 47 GHz band, including segmentation of the band to prevent sharing with other services, license blocks of 100 megahertz paired blocks separated by 500 megahertz, and larger area-wide licensing, among other operating and technical rules.[41]

2. Petitions To Deny, Dismiss, or Reject

31. In response to the Application, Motorola filed a petition to dismiss or deny, HCI filed a petition to deny, and TIA filed a petition to defer the Application. Lockheed Martin filed comments in which it argues that the Application cannot be granted at this time. Sky Station filed a consolidated opposition to the petitions. Motorola and HCI each filed a reply to the consolidated opposition. In response to the Request and Petition, Motorola filed an opposition and request to reject the Petition, and HCI filed an opposition. TIA filed comments requesting that we resolve several issues before granting the Request and Petition. Harris filed comments in support of HCI and TIA. USSB requests that we require a technical evaluation on the disruptive effect of platforms on the reception of direct broadcast satellite (DBS) signals on the surface of the earth. Sky Station filed reply comments, and HCI and Motorola each filed a reply to the reply comments.

32. We grant Sky Station's alternative request to accept its Request and Petition as late-filed comments in this proceeding. In addition, we will also accept the Application as part of the comments, inasmuch as Sky Station acknowledges that the Application is filed preliminarily and is intended to illustrate the service it could provide under its proposals in the Request and Petition.[42] As discussed more fully below, petitioners do not raise issues that prevent us from including the Sky Station filings for consideration together with other comments filed in response to our proposals in the *First NPRM* to open the 47 GHz band for commercial, licensed use.

a. Nature of Service for Domestic and International Regulation

33. TIA argues that the nature of Sky Station's proposed service must be identified to determine how to classify the service and find the appropriate regulatory niche before we may adopt its proposals. TIA contends that the filings are contradictory regarding whether the ser-

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[40] *See* Reorganization and Revision of Parts 1, 2, 21, and 94 of the Rules To Establish a New Part 101 Governing Terrestrial Microwave Fixed Radio Services, WT Docket No. 94-148, Amendment of Part 21 of the Commission's Rules for the Domestic Public Fixed Radio Services, CC Docket No. 93-2, and McCaw Cellular Communications, Inc., Petition for Rulemaking, RM-7681, Report and Order, 11 FCC Rcd 13449 (1996) (*Part 101 Report and Order*).

[41] Sky Station Further Comments at 5-7, 10-12.

[42] *Id.* at 1 n.1.

vice is terrestrial or satellite, fixed or mobile. It contends that the service does not fit the international service definition that defines Radio-Relay Systems to be fixed services operating via terrestrial stations. TIA argues that the proposed service would be similar to a satellite based system as an interference source, that the platform qualifies as a Space Station under the definitions, and that it should be considered to be a Mobile-Satellite System.[43]

34. TIA proposes that the Commission and the 1997 World Radio Conference (WRC-97) establish a new service category for any airborne service operating in the stratosphere or below, apart from aviation services, that would be defined as a Global Airborne Telecommunications Service. The category would stimulate innovative airborne services and would be consistent with allocation requirements.[44] Harris agrees that the nature of the service should be clarified and that the Global Airborne category might be the solution to accommodating various airborne services that will have characteristics similar to the Sky Station proposal.[45]

35. Motorola also argues that the proposed service requires a new allocation. It contends that terrestrial fixed and mobile service allocations do not contemplate stratosphere-to-earth and earth-to-stratosphere communications provided by means of stratospheric balloon-supported platforms. It asserts that the platforms should be disqualified as fixed or mobile terrestrial services because of their placement above the earth's atmosphere, and should instead be defined as spacecraft. Motorola further argues that the platforms would lie within sovereign airspace, and that countries may view the proposed service as an infringement of their rights. It contends that we should refrain from pursuing an international allocation for the proposed service.[46]

36. In the *36-51 GHz Band Plan NPRM*, we determined that Sky Station's proposed use of spectrum in the 47 GHz band for its stratospheric radio relay repeater system is considered to be a terrestrial service.[47] In its Further Comments, Sky Station has clarified its previous filings, which TIA points out are contradictory, in order to demonstrate that the proposed service is a terrestrial, fixed operation. Users permanently mount their terminals or antennas, which communicate with the repeaters located on the platforms. We disagree with TIA and Motorola that the platform qualifies as a space station and that the proposed service should be considered to be a satellite service. The platforms proposed for use by Sky Station clearly are not satellites and, unlike satellites, will not be in earth orbit. Although the platforms will be located 30 kilometers above the earth's surface, they still will be within the earth's atmosphere

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[43] TIA Reply Comments to Request and Petition at 4-6.

[44] TIA Comments to Request and Petition at 6-7; TIA Petition To Defer Application at 3.

[45] Harris Comments to Request and Petition at 2.

[46] Motorola Opposition to Request and Petition at 4-6; Motorola Petition To Dismiss or Deny Application at 3-5.

[47] *36-51 GHz Band Plan NPRM*, at para. 17.

and will rely on atmospheric lift to keep them at that fixed altitude, which is far below the location of the lowest satellite orbit.

37. Motorola and TIA point out that there are international definitions and other international concerns that require that Sky Station's proposed service be considered in the appropriate international forums. In that context, we further point out that world spectrum management experts recently participated in the work of ITU-R WP4-9S and WP 9B and concluded that a radio-relay service like Sky Station's proposed service that uses stratospheric-based repeaters is in the fixed service. The groups developed two Proposed Draft New Recommendations (PDNRs) relating to platform-based stratospheric radio relay repeaters in the fixed service.[48] Moreover, in the *36-51 GHz Band Plan NPRM* we noted that the Ad Hoc Millimeter Wave group of the Commission's WRC-97 Advisory Committee had discussed, among other things, the possibility of satellite and fixed terrestrial services, as well as other terrestrial services operating from alternative delivery platforms, sharing spectrum in the band.[49] Thus, the use of such stratospheric-based platforms for a global service is being addressed in the appropriate forums, where issues of sovereignty and other concerns will be examined. We deny the requests of Motorola, Harris, and TIA to establish a separate allocation category for any airborne terrestrial wireless communications service as unnecessary and inefficient, inasmuch as the spectrum Sky Station seeks to use is the subject of this proceeding in which rules can be proposed to accommodate its service, as well as other terrestrial services in 47 GHz.

b. Technical, Financial, and Safety Qualifications

38. HCI and Motorola argue that the Application and the Request and Petition leave open many technical, financial, and safety concerns that must be addressed before we can act on Sky Station's request and allocate the spectrum it requests. They argue that it fails to demonstrate the technical feasibility of the service or its financial qualification to undertake and support an endeavor estimated to cost $4.2 billion. They contend that we should apply no less stringent financial qualification standards than we found were necessary for analogous global satellite applicants. They point out that Sky Station has filed no application fee nor provided any significant part of the technical and financial detail required from such similar applicants.[50] On reply, Sky Station asserts that it intends to comply fully with any financial or technical qualifications we may impose on applicants when we develop service rules, and requests that we base such rules on the unique requirements of its proposed service, which it argues would be less expensive than satellite systems.[51]

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[48] Doc. 4-9S/TEMP/30(Rev.1) and Doc. 9B/TEMP/38(Rev.1).

[49] *36-51 GHz Band Plan NPRM*, at para. 8.

[50] HCI Petition To Deny Application at 3-4; Motorola Petition To Dismiss or Deny Application at 4-10, citing Sections 25.140, 25.142(a)(4), and 25.143(b)(3) of the Commission's Rules, 47 C.F.R. §§ 25.140, 25.142(a)(4), 25.143(b)(3).

[51] Sky Station Consolidated Opposition at 11-13.

39. HCI and Motorola argue that there are significant public safety risks posed by the use and size of the platforms, their untested technology, and their location over major metropolitan areas and in aircraft flight paths. HCI requests that the procedures used for reducing public safety risks from commercial aviation and satellites should at least be addressed by Sky Station. Motorola argues that the proposal requires thorough study from the public safety, environmental, and aviation communities before we should consider allocating any spectrum to Sky Station.[52] On reply, Sky Station argues that the public safety issues are readily resolvable and do not justify delay of its filings. It describes several design and technical features of the platforms to reduce safety concerns, states that it is coordinating with Federal Aviation Administration officials for approval, and submits an analysis from a technical expert.[53]

40. We intend to solicit comment on the necessary technical and financial requirements for platform-based stratospheric services at the time we consider service rules, in a separate Notice of Proposed Rulemaking.[54] At the same time we will seek comment on the safety concerns that the platforms raise. These matters are important features of the service rules that we must adopt before any service in the 47 GHz band can be implemented. They need not be considered in this Order, however, which is limited to deciding whether to open the band to commercial, licensed use under a flexible licensing framework. The matters that HCI and Motorola seek us to address now are not factors in that decision.

c. Spectrum Sharing

41. HCI, Lockheed Martin, and Motorola are concerned that, as members of the satellite community, they will not be able to share the 47 GHz band with Sky Station's proposed service. They argue that, although the band is unused and unlicensed, it is contrary to efficient spectrum management to allocate the spectrum to a service that precludes their use of the band for future Fixed Satellite Service (FSS) and Broadcast Satellite Service (BSS) use, which is provided in the Allocation Table.[55] TIA, which is supported by Harris, is concerned that fixed point-to-point users also would be displaced from the band.[56] They argue that we should

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[52] HCI Petition To Deny Application at 4; HCI Reply at 4-5; Motorola Petition To Dismiss or Deny Application at 4-5; Motorola Reply at 3-5; Motorola Opposition to Request and Petition at 5.

[53] Sky Station Consolidated Opposition at 6-11; Sky Station Reply Comments at 9-11.

[54] See para. 21, *supra*.

[55] HCI Petition To Deny Application at 1-3; HCI Opposition and Reply to Request and Petition at 2-3; Lockheed Martin Comments to Application at 1-3; Motorola Petition To Dismiss or Deny Application at 2-3; Motorola Opposition to Request and Petition at 2-3.

[56] TIA Petition To Defer Application at 3; TIA Comments to Request and Petition at 7-10; TIA Reply Comments to Request and Petition at 6-7; Harris Reply Comments to Request and Petition at 1-2.

defer consideration of the proposal until we consider the impact of the proposal on spectrum management.

42. Since the filings of these pleadings, we have initiated a spectrum plan in the *36-51 GHz Band Plan NPRM* in order to address the competing demands between satellite and terrestrial interests for spectrum allocations for provision of commercial services. Although we maintained the 47 GHz band for predominantly wireless services, we identified additional bands for predominantly satellite services that include the adjacent 48.2-50.2 GHz bands, among others. Thus, the spectrum management issues raised by petitioners here are matters addressed in that proceeding and are not a basis for delaying this proceeding. As for the additional matters the parties seek to raise here concerning licensed uses of the band, we will include those comments in our consideration of licensing issues in the following sections of this Order.

C. Commercial Use

1. Comments

43. Numerous comments to the *First NPRM*, as a general matter, support our initiative to open the identified frequency bands above 40 GHz, which includes 47 GHz, for commercial use.[57] AAR and HCP commend our proposal as farsighted in clearing a path to facilitate the introduction of new technologies and providing important public benefits.[58] Hughes argues that the response to opening the bands above 40 GHz will be similar to our previous proposals to open the fallow 38 GHz band, when numerous manufacturers quickly took steps to meet the demand for 38 GHz equipment. Hughes contends that other countries are turning to the bands above 40 GHz as a means to serve their terrestrial broadband needs, including broadband video services, and that licensing these bands in the United States will promote competitiveness internationally by stimulating the development of technology for potential uses in other parts of the world.[59]

44. Several commenters argue that technology for commercial use of spectrum above 40 GHz is now feasible. NTIA contends that millimeter wave frequencies were not desirable for commercial use in the past due to the high cost of equipment to operate in these bands, but that advances in semiconductor technology have resulted in declining equipment costs and new uses.[60] It argues that commercial use will permit the development of systems with greater

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[57] AT&T Comments at 1; HCP Comments at 2; Hughes Comments at 1; mmWAG Comments at 2; Martin Marietta Comments at 1; Motorola Reply Comments at 1; Pacific Bell Comments at 1; TI Comments at 1.

[58] AAR Reply Comments at 6; HCP Comments at 2.

[59] Hughes Comments at 11-12.

[60] NTIA Comments at 1.

capabilities that will benefit a large variety of users, including the Federal Government. MACOM contends that millimeter wave technology has advanced to the point where devices and subsystems will be available to support commercial exploitation if we open up the radio spectrum above 40 GHz.[61] HP agrees, and argues that regulatory permission and international coordination are necessary for private industry to risk the investment required to develop commercial products and sell them abroad.[62] Avant-Garde provides commercial shorthaul services in the 38 GHz band and argues that the band exhibits propagation characteristics similar to other bands above 40 GHz, demonstrating that commercial use of millimeter wave transmission is practical.[63]

45. Sky Station argues that its proposal to provide a stratospheric-based service will encourage the commercial development of the unused millimeter wave band and promote our policy goals stated in the *First NPRM*. Sky Station contends that its service will position the United States as a world leader in stratospheric telecommunications technology and promote substantial job opportunity and economic growth by creating a new market for stratospheric platforms, millimeter wave chipsets, 47 GHz transmission equipment, and global broadband wireless services. It argues that the large service capability of each platform and the five-year implementation schedule for deployment of 250 platforms will provide global coverage for the wireless personal telecommunications services that consumers and developing countries seek at an inexpensive rate.[64] Sky Station submits in the Application extensive information that it argues demonstrates the technical and operational feasibility of the platforms, including the mechanical, power, telecommunications links, and operational concerns.[65]

46. Approximately 30 letters were filed by individuals, groups, and a few foreign representatives in support of Sky Station's proposal. Of them, certain technology developers, such as U.S. Robotics, argue that the proposed service will encourage the development of new technologies that would create new methods for broadband and portable wireless access.[66] Certain financial institutions, such as JPMorgan, support Sky Station's technology as a potential breakthrough in providing low cost telecommunications.[67] Other letters from potential users, such as CARE and WWF, argue that a global, low-cost telecommunications service such as that proposed would enable them to monitor their international projects and achieve their

[61] MACOM Reply Comments at 1.

[62] HP Comments at 2.

[63] Avant Garde Comments at 2.

[64] Sky Station Request and Petition at 8-13.

[65] Sky Station Application at 2-30.

[66] U.S. Robotics Letter to Request and Petition.

[67] JPMorgan Letter to Request and Petition.

goals more efficiently and effectively.[68] In addition, TIA supports the introduction and implementation of new technologies that fully exploit the bands above 40 GHz, and generally does not oppose the services proposed by Sky Station.[69]

2. Discussion

47. We adopt our proposal to open the 47 GHz band for commercial applications and technologies. As we stated in the *First NPRM*, the millimeter wave bands such as 47 GHz are a major resource that essentially is undeveloped and unavailable today for commercial use. We find that there is broad consensus that our proposal to open frequency bands above 40 GHz to commercial development will provide the public with access to new products and communications services and provide new opportunities for business and economic growth.

48. Despite the different characteristics of millimeter wave frequencies from lower frequencies, the comments demonstrate that technology for commercial use of the 47 GHz band essentially is available today and that adopting our proposals will spur rapid development of even more advanced technology in the near future. It has been our experience that opening regions of the spectrum to commercial use stimulates investment and technological development in the spectrum that brings benefits to consumers and the national economy in the form of new communications services, lower costs, and a more competitive industry. The comments in this proceeding suggest that this will be the case with respect to the 47 GHz band. Developers of technology point out that this frequency band is not far from the commercial frequencies below 40 GHz, and that commercial use of such nearby bands is practical and feasible.

49. In addition, there may be many new and innovative commercial uses for this band that we did not contemplate in the *First NPRM*. As we noted in the *36-51 GHz Band Plan NPRM*, technological developments have cleared the path for new applications for 47 GHz since the *First NPRM*, including Sky Station's proposed service.[70] We pointed out in the *First NPRM* that Section 7 of the Communications Act directs us to encourage the provision of new technologies and services to the public.[71] Opening the 47 GHz band for commercial use that includes such novel uses of the stratosphere furthers our goals to encourage and facilitate further technology transfer from the military sector, create opportunities for economic growth, and promote United States competitiveness internationally by enabling development of technology for potential use in other parts of the world.

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[68] CARE Letter to Request and Petition; WWF Letter to Request and Petition.

[69] TIA Reply Comments to Request and Petition at 7.

[70] *36-51 GHz Band Plan NPRM*, at para. 6.

[71] *First NPRM*, 9 FCC Rcd at 7082, citing 47 U.S.C. § 157.

D. Flexible Licensing Framework

1. Comments

50. Many comments address, as a general matter, our proposal in the *First NPRM* to designate the bands for licensed use authorizing the full range of services allowed under the Allocation Table and to prescribe the service rules for licensing the spectrum based on the likely dominant use of the band. NTIA commends our flexible proposal to retain in those licensed bands the full range of services presently allowed under the Table. It supports our proposal as consistent with its goal of promoting the principles of flexibility in licensed uses, which require that systems not be licensed according to technical and service rules specific to a service, but rather according to other users' interference rights.[72] In developing technical and operational regulations for the bands above 40 GHz, Metricom requests that we rely on a flexible regulatory approach and adopt only broad and general rules to promote the most efficient operations in a band, while providing the requisite protection from harmful interference.[73]

51. mmWAG identifies a number of potential uses for the bands above 40 GHz. It envisions that the bands could be used for broadband capabilities in concert with fiber and other information communications techniques.[74] They could serve the emerging PCS industry as a means for major backhaul links. LMDS-type applications could include video distribution to businesses and homes for interactive services and information access. The bands could meet the requirements for wireless premises area communications networks and support extremely high speed applications, such as SONET speeds and beyond.[75]

52. Motorola, in response to the *First NPRM*, states that it does not comment on the proposed licensing framework because the proposals do not encompass satellite technologies. It asserts that, inasmuch as we found the potential dominant use to be a terrestrial service and proposed to define licensing rules to reflect that dominant use, the licensing rules would make no sense for satellite services. Motorola points out that it is well established that satellite services are not amenable to licensing rules for terrestrial services.[76] HP points out that, since the comments from satellite interests do not propose rules to include satellite services among the users in the frequencies above 40 GHz and they do not appear to have an interest in these

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[72] NTIA Comments at 2.

[73] Metricom Comments at 4.

[74] mmWAG Comments at 6.

[75] mmWAG Reply Comments at 5.

[76] Motorola Reply Comments at 5.

bands, we should concentrate on multipoint distribution, point-to-point communication, premises communication, and the vehicular radar terrestrial services at issue.[77]

53. Other commenters support our proposal to provide for broad-based flexible service as long as their interest in short-range, fixed, point-to-point links is accommodated by expanding the spectrum to be allocated to include additional bands. AT&T, HP, and mmWAG request that we modify our proposal to license the 47 GHz band by allocating an additional 2 gigahertz of spectrum from 48.2-50.2 GHz.[78] HP argues that the proposal provides an opportunity for expanded multipoint distribution service of the LMDS type as well as fixed point-to-point licensed services.[79] Alcatel, Harris, and TIA also request that we modify our proposal for the 47 GHz band by adding the band at 48.5-51.4 GHz for point-to-point services. To accommodate these additional services, they request we establish a 500 megahertz guardband between the new services and the licensed uses we proposed for the 47 GHz band by shifting the 47 GHz band to 47.0-48.0 GHz.[80]

54. TIA supports our goal to encourage innovation and worldwide competitiveness, and agrees that our proposal for broad area-based licensing would give flexibility to fixed point-to-point microwave users. It requests that the spectrum it seeks to be added at 48.5-51.4 GHz be dedicated to non-area based, link-per-link, traditional licensing not subject to auctioning, which services it argues otherwise would be overlooked in our "open market" licensing by auction.[81] HCP agrees that there is a need for additional spectrum that can serve the purposes similar to LMDS in providing point-to-multipoint service and that the basic regulatory framework we proposed, that includes auctioning wide bandwidths on an area-wide basis, is appropriate for such licensed uses.[82]

55. Sky Station argues that its technology is designed to take advantage of frequency in the 47 GHz band and that, unlike many other proposed services, its service is uniquely suited for the band and allowed under the Allocation Table. It argues that a unique feature of the stratospheric-based platform is its high elevation angles and high power, enabling useful communication links to be provided with high reliability in the 47 GHz region, despite the high water vapor attenuation and dry air path losses occurring in the millimeter wave band.[83] It expects to provide a global broadband personal communications service that interconnects

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[77] HP Reply Comments at 4.

[78] *Id.* at 4-5; AT&T Reply Comments at 6; mmWAG Reply Comments at 2-3.

[79] HP Reply Comments at 5.

[80] Alcatel Reply Comments at 1; Harris Reply Comments at 1; TIA Reply Comments at 2, 8-9.

[81] TIA Comments at i, 5-6.

[82] HCP Comments at 4, 10-11; HCP Reply Comments at 2-3.

[83] Sky Station Request and Petition at 12-13.

with the Internet's World Wide Web in competition with cellular and PCS wireless services, as well as future satellite services.[84] The operations constitute fixed services, although Sky Station expects to include mobile services.[85] The stratospheric platforms are fixed, as are the base stations, and many of the subscribers will be fixed. Depending on their location within the Sky Station coverage areas, subscribers will use fixed or portable communicators with varying antenna profiles to interconnect with the public switched telephone network or communicate with another Sky Station communicator, computers, or other compatible devices that are linked to the Sky Station system via Sky Station earth stations.[86]

56. Several of the letters filed in support of its proposed service urge us to permit Sky Station to implement its competitive service. Representatives of three foreign countries and several advocates for the developing world seek access to inexpensive communications service to improve the lives and opportunities of consumers around the world.[87] BET and Eden, as entertainment companies, support access to a wireless interactive communications system.[88]

57. Sky Station states that the proposed service cannot share co-channel frequencies with conventional fixed, mobile, or satellite services and requests that we dedicate to its exclusive use the portions of the band at 47.2-47.5 GHz for earth-to-stratosphere and 47.9-48.2 GHz for stratosphere-to-earth to ensure its success and maximize use of the spectrum. It argues that only the dedication of 600 megahertz of spectrum will support the multiple, global services it proposes.[89] It requests that we modify the Allocation Table to permit only fixed and mobile stratospheric systems to operate in these sub-bands. It also requests that Footnote 901 and US Footnote 297 be modified to identify its exclusive use in these bands and exclude broadcast satellite service (BSS) feeder links, as well.[90]

58. In reply to Sky Station's filing, HCI and Motorola argue that, although the band is not used today for the fixed satellite service (FSS) or BSS, the band provides much needed expansion capacity to accommodate future use requirements of those services. They argue that the band provides a basis for growth in the satellite sector and that we should ensure that suf-

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[84] *Id.*, Attachment 1, at 1, 9-11.

[85] Sky Station Further Comments at 2, 8-9.

[86] Sky Station Application at 7-15, Sky Station Reply Comments at 3.

[87] Letters to Request and Petition from Britain's Overseas Development Administration; Australia's Ausproject International Pty. Ltd.; Mexico's MESON; CARE; Mercy Medical Airlift; VITA.

[88] BET Letter to Request and Petition; Eden Letter to Request and Petition.

[89] Sky Station Application at Attachment, The Global Market for GSTS; Sky Station Reply Comments at 6-8. See para. 27, *supra*.

[90] Sky Station Request and Petition at 15, Attachment 3.

ficient spectrum remains available for FSS and BSS.[91] TIA argues that Sky Station does not need the entire 600 megahertz it requests for exclusive use, but rather demonstrates that a minimum of 20 megahertz would be sufficient. It argues that Sky Station and the supporting letters fail to explain how the proposed service would be implemented or how the spectrum could be managed with such a service to protect other users of the bands where Sky Station would be operating.[92]

59. Avant-Garde argues that, depending on the anticipated uses for the spectrum and changed circumstances, we may need to reexamine our proposal to rely on the same service rules we proposed for LMDS in the 28 GHz band. It contends that our remaining proposals concerning license territory size and amount of spectrum to be awarded to each licensee, among others, are potentially affected by the intended use of the spectrum. Avant-Garde questions whether the licensing scheme originally proposed for LMDS would be appropriate for the bands above 40 GHz, or whether some other licensing methodology would better meet the needs of the commercial service providers reflected in the comments. It contends that we must ensure that any of the bands we may license are not artificially constrained in the manner in which they are licensed or used in order to maximize public interest benefits.[93]

60. EndGate and MACOM, as suppliers and developers of millimeter wave equipment, essentially argue that the millimeter wave technology is available for services above 40 GHz that are similar to the point-to-multipoint services proposed for the 28 GHz band, but that the technology would evolve differently to reflect the different frequency characteristics.[94] MACOM contends that the 28 GHz band is well suited for a video distribution service to the general public, which employs wide beam, low gain transmitting antennas rather than the narrower beam, higher gain antennas that would provide a more specialized service.[95]

2. Discussion

61. We adopt our proposal to license the 47 GHz band for commercial service and we find that our proposal to allow any use under the Allocation Table reflects the best approach to licensing this band. As a ``frontier" band located in the frequencies above 40 GHz that are yet to be opened for commercial development, the exact nature of the services to emerge from the development of the 47 GHz band cannot be predicted in the comments. As a general matter, the comments identify as a potential use the short range, high speed, point-to-point com-

[91] Hughes Opposition and Reply to Request and Petition at 2; Hughes Reply to Application at 2; Motorola Opposition to Request and Petition at 2-4.

[92] TIA Comments to the Request and Petition at 7-8; TIA Reply Comments at 3.

[93] Avant-Garde Comments at 2-3.

[94] Endgate Comments at 1-2.

[95] MACOM Comments at 1-2.

munications links that are the traditional applications for millimeter wave frequencies. In seeking to use the general spectrum for such service, HCP, HP, and other commenters confirm that there is a demand to use the band for the broader fixed, point-to-multipoint services we have expected. The comments demonstrate that, although the point-to-multipoint services would not be based on the same technology as LMDS, the technology is available for development to exploit 47 GHz for such point-to-multipoint services and provide the commercial services in demand. Although Motorola and HCI do not seek to use the spectrum now for satellite services, they seek to retain access to the band in case of future needs.

62. In addition, there could be many new and innovative licensed uses for 47 GHz that cannot be predicted. Sky Station contends that the 47 GHz band is an appropriate frequency for it to deploy its stratospheric-based platforms for a new, unique delivery system for a global wireless communications system. Although the system provides a fixed, point-to-multipoint service, the technology is new and may eventually involve mobile services. As currently envisioned, the system relies on the use of the platform fixed at 18 miles above the earth, rather than the traditional tower, in a central location for transmitting to, and receiving transmissions from, multiple stations within its service area. The record supports the view we expressed in the *First NPRM* that there is not sufficient information to establish the exact uses that licensees in the 47 GHz band would develop for the licensed spectrum.

63. We conclude that all identified uses of the 47 GHz band may be valuable and should be permitted. The record also confirms that both the technology and potential applications of millimeter wave spectrum will continue to evolve rapidly. Since we initiated this proceeding we have seen important new technologies proposed for the millimeter wave spectrum, and it is likely that other technologies also will be developed. Under the circumstances, we conclude that we should not limit the types of services that can be offered in the band.

64. Accordingly, we adopt our proposal to license the 47 GHz band based on the services currently allowed under the Allocation Table. The spectrum from 47.2 to 50.2 GHz is allocated domestically for Government and non-Government Fixed, Fixed-Satellite, and Mobile uses, and internationally for the same uses.[96] We find that the range of services covers all of the services identified as potential uses of the 47 GHz band. We confirm the view that we expressed in the *First NPRM* that a broadly defined service allocation coupled with the licensing, technical, and operating rules to be proposed in a subsequent rulemaking will provide the best means of assuring that this spectrum will be used to the greatest benefit of the public.

65. We deny the requests of AT&T, HP, mmWAG, Alcatel, Harris, and TIA to expand the band to include spectrum up to 51 GHz in order to provide for point-to-point services. That additional spectrum in the adjacent bands will be addressed in response to the *36-51 GHz Band Plan NPRM*, in which we proposed to designate the portion 48.2-50.2 GHz for

[96] 47 C.F.R. § 2.106.

predominantly satellite use. We point out that point-to-point services may be provided in the 47 GHz band under the allocations for that band.

66. We disagree with TIA's assertion that licensing on such an "open-market" basis, which provides licensees with broad flexibility to engage in any uses under the Allocation Table, evades our statutory responsibilities under Section 303(c) and, in light of our proposal to auction the spectrum, is inconsistent with Section 309(j) of the Communications Act.[97] The Commission has broad authority under the Communications Act to designate spectrum usage, as well as the authority to perform any and all acts necessary in the execution of our functions.[98] Our designation of more than one service for the 47 GHz band is consistent with the Commission's authority and obligations under the Communications Act. Section 303 of the Communications Act does not restrict the Commission's discretion to prescribe the nature of the service to be rendered over radio frequencies or our authority to allocate frequencies to the various classes of stations or assign spectrum to stations for more than one permissible use.[99] We have already discussed this issue in other decisions and our action here is consistent with precedent.[100] With respect to allocation decisions, courts have accorded ``substantial deference" to Commission determinations.[101] Commission precedent also supports the permissibility of allocating spectrum in a manner that allows for a range of uses.[102]

67. In light of the range of possible uses, the likelihood that new uses can be developed in the future, and the lack of a record for specific service designations that would better serve the public interest and the goals of the Communications Act, our broad service designation comports with the public interest and with our statutory authority. Our decision to designate this spectrum in this manner is unrelated to our proposal in the *First NPRM* to award licenses through competitive bidding. The designation is not entirely open-ended and will be

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[97] TIA Comments at 19-23, citing 47 U.S.C. §§303(c), 309(j).

[98] *See* Section 4(i) of the Communications Act, 47 U.S.C. § 154(i).

[99] We acknowledge that certain other sections of the Communications Act reflect the fact that Congress expected the Commission to utilize some amount of spectrum for particular types of services. *See, e.g.*, 47 U.S.C. § 309(b) (referring to fixed point-to-point microwave stations, industrial radio positioning stations, and aeronautical stations); 47 U.S.C. § 319 (distinguishing among amateur stations, mobile stations, public coast stations, privately owned fixed microwave stations, common carrier stations, and broadcast stations). Nevertheless, these sections cannot be read to limit the Commission's discretion to permit the use of spectrum for more broadly defined services.

[100] *See, e.g.*, Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use, ET Docket No. 94-32, Second Report and Order, 11 FCC Rcd 624 (1995) (*GWCS Second Report and Order*), *recon. pending*; *Part 27 Report and Order*, at paras. 29-32.

[101] *See* National Ass'n of Regulatory Util. Comm'ners v. FCC, 525 F.2d 630, 636 (D.C. Cir.), *cert. denied*, 425 U.S. 992 (1976); *see also* Telocator Network of America v. FCC, 691 F.2d 525, 549 (D.C.Cir. 1982).

[102] Amendment of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems, GN Docket Nos. 84-12321, 84-1233, and 84-1234, Report and Order, 2 FCC Rcd 1825, 1841 (1986), *recon. denied*, 2 FCC Rcd 6830 (1987).